

SECTION 17: LIGHTING

Section 17.0: Purpose and Intent

Legislative Intent

- A. It is hereby found that the topography and atmospheric conditions of Coconino County, Arizona, are uniquely suited for astronomical observation, that a substantial investment has been made in observatories in the County, and that the use of certain types of outdoor lights and certain outdoor lighting practices have an adverse impact on astronomical observation. It is further recognized that naturally dark landscapes and star-filled skies are valued by many, and that poor lighting practices in outdoor lighting waste energy, hamper the reasonable use and enjoyment of property and can endanger the public welfare by producing unnecessary glare.
- B. Accordingly, it is the intent of this Ordinance to encourage lighting practices and systems which will minimize light pollution, light trespass, and conserve energy while maintaining night-time safety, utility, security and productivity. Since not all areas in the County are near established observatories, four Lighting Zones are established, allowing increased flexibility in the uses of outdoor lighting further from the observatories.
- C. There may be other areas that are worthy of designation where protection of the night sky is deemed to be highly important, and where the establishment of more restrictive Lighting Zones is desired.

Section 17.1: Conflicting Regulations

- A. In the event of conflict between the regulations set forth in this Ordinance and any other regulations applicable to the same area, the more stringent limitation and requirement shall govern.

Section 17.2: Approved Materials and Methods of Construction or Installation/Operation

- A. The provisions of this Ordinance are not intended to prevent the use of any design, material or method of installation or operation not specifically prescribed by this code, provided any such alternate has been approved by the Community Development Director. The Community Development Director may approve any such proposed alternate provided he/she finds that it:
 - 1. Provides at least approximate equivalence to the applicable specific requirements of this Ordinance; and

2. Is otherwise satisfactory and complies with the intent of this Ordinance.

Section 17.3: Definitions

As used in this Ordinance, unless the context clearly indicates otherwise, certain words and phrases shall mean the following:

ABANDONMENT means the discontinuation of use for a period of six months.

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CLASS 1 LIGHTING means all outdoor lighting used for but not limited to outdoor sales or eating areas, assembly or repair areas, advertising and other signs, recreational facilities and other similar applications where COLOR RENDITION IS IMPORTANT to preserve the effectiveness of the activity.

CLASS 2 LIGHTING means all outdoor lighting used for but not limited to illumination for walkways, roadways, equipment yards, parking lots and outdoor security where GENERAL ILLUMINATION of the grounds is the primary concern.

CLASS 3 LIGHTING means any outdoor lighting used for DECORATIVE effects, including but not limited to architectural illumination, flag and monument lighting, and illumination of trees, bushes, landscape features, etc.

COMMUNITY DEVELOPMENT DIRECTOR means the Director of Community Development for Coconino County.

DEVELOPMENT PROJECT means any residential, commercial, industrial or mixed use subdivision plan or development plan which is submitted to the County for approval.

DIRECT ILLUMINATION means illumination resulting from light emitted directly from a lamp or luminaire, not light diffused through translucent signs or reflected from other surfaces such as the ground or building faces.

FULLY SHIELDED FIXTURE means a light fixture or luminous tube constructed and mounted such that all light emitted by the fixture or tube, either directly from the lamp, tube, or a diffusing element, or indirectly by reflection or refraction from any part of the luminaire, is projected below the horizontal.

A practical working way to determine if a fixture or tube is fully shielded: if the lamp or tube, any reflective surface, or lens cover (clear or prismatic) is visible when viewed from above or directly from the side, from any angle around the fixture or tube, the

fixture or tube *is not* fully shielded.

Examples of fixtures that are Fully Shielded (Note: to be fully shielded these fixtures must be closed on top and mounted such that the bottom opening is horizontal):

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Examples of fixtures that are NOT Fully Shielded:

			*	*
			*	

* Note: even though the lamp in these fixtures is shielded from direct view when viewed from the side or above, reflective surfaces and/or lens covers *are* directly visible from the side.

Note for luminous (neon) tubes: when such lighting is installed under or behind a roof overhang, if the roof-line or eave is not horizontal the tubing may be visible from above when viewed from the side and therefore be unshielded.

HIGH-PRESSURE SODIUM is a type of lamp using sodium and mercury vapor at high pressure to produce light.

HPS = high-pressure sodium.

INSTALLED means attached, or fixed in place, whether or not connected to a power source.

LIGHT POLLUTION is any adverse effect of manmade lighting; light where it is not

needed or wanted; wasted light.

LOW-PRESSURE SODIUM is a type of lamp using sodium vapor at low pressure to produce light.

LPS = low-pressure sodium.

LUMEN is the unit used to measure the actual amount of visible light that is produced by a lamp.

LUMINAIRE means the complete lighting assembly, including the lamp, housing, shields, lenses and associated electronics, less the support assembly. A light fixture.

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LUMINOUS TUBE means a glass tube filled with a gas or gas mixture (including neon, argon, mercury or other gasses), usually of small diameter (10-15 millimeter), caused to emit light by the passage of an electric current, and commonly bent into various forms for use as decoration or signs. A "neon" tube. Does not include common fluorescent tubes.

METAL HALIDE is a type of lamp using mercury and metal halide(s) to produce light.

MH = metal halide.

NEON TUBE (see Luminous Tube)

OUTDOOR LIGHT FIXTURE means an outdoor electrically powered illuminating device, outdoor lighting or reflective surface, lamp, luminous tube or and similar devices, either permanently installed or portable, which is used for illumination or advertisement. Such devices shall include, but are not limited to, search, spot and flood lights for:

- (a) buildings and structures
- (b) recreational areas
- (c) parking lot lighting
- (d) landscape and architectural lighting
- (e) billboards and other signs (advertising or other)
- (f) street lighting
- (g) product display area lighting
- (h) building overhangs and open canopies
- (i) pedestrian walkways or areas
- (j) building or landscape decoration

OUTDOOR RECREATION FACILITY means an area designed for active recreation, whether publicly or privately owned, including, but not limited to, baseball diamonds, soccer and football fields, golf courses, tennis courts and swimming pools.

PERSON means any individual, lessee, owner, or any commercial entity including but not limited to firm, business, partnership, joint venture, or corporation.

TEMPORARY LIGHTING means lighting which does not conform to the provisions of this Ordinance and which will not be used for more than one thirty (30) day period within a calendar year. Temporary lighting is intended for uses which by their nature are of limited duration; e.g. civic events, or construction projects.

TOTAL OUTDOOR LIGHT OUTPUT means the maximum total amount of light, measured in lumens, from all outdoor light fixtures on a project site. Includes all lights and luminous tubing used for Class 1, Class 2, Class 3 lighting, and lights used for external illumination of signs, but does not include lights used to illuminate internally illuminated signs or luminous tubing used in neon signs. For lamp types that vary in their output as they age (such as high pressure sodium, metal halide, and fluorescent), the initial output, as defined by the manufacturer, is the value to be considered. For luminous tubes, output is calculated per linear foot of tubing rather than per lamp.

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Section 17.4: Establishment of Astronomical Zones

- A. Lighting Zones: Different areas, with different developed and natural conditions, and different distances from astronomical observatories, have differing levels of appropriate light usage, and different sensitivities to the various obtrusive aspects of outdoor light usage. Because of this, three Lighting Zones are hereby defined and established. These Zones are shown on the Lighting Zone Maps that are attached hereto as Map 1a and Map 1b and by this reference made a part hereof. In general, these Zones are described as follows:
1. Zone I: all area within Coconino County located within two-point-five (2.5) miles of the following locations:
 - a. The Hall telescope at Lowell Observatory on Anderson Mesa
 - b. The Kaj Strand telescope at the U.S. Naval Observatory
 - c. Roden Crater
 2. Zone II: all areas within Coconino County more than two-point-five miles yet less

than seven (7) miles from the locations listed in part 17.4.A.1 above.

3. Zone III: all other areas within Coconino County.

- B. Split Parcels: A parcel located in more than one of the described Lighting Zones shall be considered to be only in the more restrictive Lighting Zone.

Section 17.5: Preferred Source and Zone I Use Preference

- A. Preferred Source: Low-pressure Sodium (LPS) lamps are the preferred illumination source throughout the County; their use is to be encouraged, when not required, for outdoor illumination whenever its use would not be detrimental to the use of the property.
- B. Day/Night Uses: Uses which can turn off their outdoor lighting during night hours are to be encouraged in Lighting Zone I; those which require all night illumination are to be discouraged.

Section 17.6: General Requirements, all Zones

- A. Upward-directed Floodlighting: Outdoor floodlighting by flood light projection above the horizontal plane is prohibited.
- B. The requirements for lamp source and shielding of light emissions for outdoor light fixtures are as follows:

Use Code:

A = allowed

F = allowed, fully shielded

X = prohibited

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Table 17.6.B
Lamp Type and Shielding Standards

LAMP TYPE	ZONE I	ZONE II	ZONE III
Class 1 Lighting:			
Low-pressure Sodium	F	F	F
Others above 2500 lumens (1)	X	F	F
Others below 2500 lumens (1)	F	F	A(2,3)
Class 2 Lighting:			
Low-pressure Sodium	F	F	F
Others above 2500 lumens (1)	X	X	X
Others below 2500 lumens (1)	F	F	A(2,3)
Class 3 Lighting:			
Low-pressure Sodium	F	F	F
Others above 2500 lumens (1)	X	X	F
Others below 2500 lumens (1)	F	A(2,3)	A(2,3)
Residential Lighting (all classes):			
All types over 1000 lumens (1)	F	F	F
All types below 1000 lumens (1)	F	A(2,4)	A(2,4)

Note 1. Examples of lamp types of 2000 (1000) lumens and below (The acceptability of a particular light is decided by its lumen output, not wattage; values listed are approximate; check manufacturer's specifications):

- (a) 100 (60) Watt Standard incandescent and less
- (b) 100 (60) Watt Tungsten-Halogen (quartz) and less
- (c) No available High-pressure Sodium or Metal Halide
- (d) 25 (15) Watt Fluorescent and less
- (e) 26 (13) Watt Compact Fluorescent and less

Note 2. Lights shall be shielded whenever feasible to minimize light spilled into the night sky or adjacent properties.

Note 3. Unshielded lighting is limited to a total of 3000 lumens per acre on non-residential and multi-family residential land uses; 2000 lumens per residence on single-family residential properties.

Note 4. For single-family residential uses, unshielded fixtures up to 2000 lumens output per lamp and a total of 8000 lumens per residence are permitted if used in functioning motion-sensing fixtures that remain on for short periods only.

C. Total Outdoor Light Output: Total Outdoor Light Output, excluding streetlights used to illuminate public rights-of-way, shall not exceed the following limits averaged over the entire project (values listed are total initial lamp lumens per acre and per residence):

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Table 17.6.C
Maximum Total Outdoor Light Output Standards
(values listed are lumens per acre and lumens per residence)

Land Use	Lighting Zone		
	I	II	III
Commercial, Industrial, and Multifamily (lumens per acre)			
total (shielded + unshielded)	25,000	50,000	100,000
unshielded only	0	3,000	3,000
Non-LPS	2,500	50,000	100,000
Single-family Residential (lumens per residence)			
total (shielded + unshielded)	10,000	30,000	30,000
unshielded only	0	30,000	30,000

Note 1. Fixtures installed such that all parts of the fixture are located underneath and at least five feet from the nearest edge of a building overhang, roof eave, or balcony are to be included in the total outdoor light output as though they produced only one-quarter of the lamp's rated lumen output.

- D. Effective Shielding: All light fixtures which are required to be shielded shall be installed in such a manner that the shielding is effective as defined in Section 17.3 under Fully Shielded Fixture and Partially Shielded Fixture.
- E. Direct Lighting on Site: All light fixtures, except streetlamps, shall be aimed or shielded so that the direct illumination shall be confined to the property boundaries of the source as much as is feasible.
- F. Direct Lighting off Roadways: All light fixtures, except streetlamps, shall be installed in such a manner that the direct illumination does not fall onto any public or private street or road as much as is feasible.
- G. Curfews: Class 1 and Class 3 lighting must be extinguished at the curfew times listed in Table 17.6.G, or no later than 30 minutes after the business closes, whichever is later (for holiday decoration exemption see 17.9.B):

Table 17.6.G

Lighting Curfews
(Sports, Class 1, Class 3, Signs)

Lighting Zone		
I	II	III
9:00pm	10:00pm	11:00pm

- H. High-Intensity Lights: Search lights, laser source lights, or any similar high-intensity light shall not be permitted, except in emergencies by police and fire personnel or at their direction.
- I. Mercury Vapor Sales: The installation, sale, offering for sale, lease or purchase of any mercury vapor light fixture or lamp for use as outdoor lighting is prohibited, except that until 1 January 2006, the provisions of this subsection shall not apply to any replacement lamp.

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Section 17.7: Special Requirements, Outdoor Advertising Signs

A. Externally Illuminated Sign Standards: External illumination for signs shall conform to all provisions of this Code. In particular, such lighting shall be treated as Class 1 lighting and shall conform to the lamp source, shielding restrictions and lumen caps of Section 17.6. All upward-directed sign lighting is prohibited.

B. Internally Illuminated Sign and Neon Sign Standards:

1. Illumination of Copy and Background; Colors: Outdoor internally-illuminated advertising signs must be constructed as follows:

a.

In Lighting Zone I: the sign face(s) must be composed of illuminated text and symbols against an opaque (unilluminated) background. The colors of these elements are not restricted.

b.

In Lighting Zones II and III: the sign face(s) must be either composed of illuminated text and symbols against an opaque background or with generally LIGHTER text and symbols against a colored (not white, off-white, light gray, cream or yellow) background.

2. Exclusion of Lamp Outputs: Lamps used for internal illumination of signs shall not be counted toward the lumen caps in Section 17.6.C.

3. Neon Signs: Neon signs shall be treated as internally illuminated signs for the purposes of this Code, and shall not have their luminous outputs counted toward the lumen caps in Section 17.6.C. Neon lighting extending beyond the area considered to be the sign area (as defined in the Sign Code of this jurisdiction) shall conform to all provisions of this Code. In particular, such lighting shall be treated as Class 3 (decorative) lighting and shall conform to the lumen caps and shielding standards of Section 17.6.

4. Non-Sign Lighting: Other internally-illuminated panels or decorations not considered to be signage according to the sign code of this jurisdiction (such as illuminated canopy margins or building faces), shall be considered decorative (Class 3) lighting, and shall be subject to the standards applicable for such lighting, including but not limited to the lamp source, shielding standards and lumens per acre caps of Section 17.6.

- C. Curfews: Illumination for all advertising signs, both externally and internally illuminated, shall be turned off no later than the curfew times listed in Table 17.6.G or when the business closes, whichever is later. Signs subject to curfews are required to have functioning and properly adjusted automatic shut-off timers.
- D. Curfews for Pre-Existing Signs: Light background (white, off-white, light gray, cream or yellow) internally illuminated signs, installed legally before enactment of this code [December 18, 2001], may continue to be used and illuminated but must conform to the curfews of Section 17.6.G.

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Section 17.8: Special Requirements, Special Uses

A. Service Station Canopies:

1. Lighting Class: Lighting for service station canopies shall be considered Class 1 lighting.
2. Shielding: All luminaires mounted on or recessed into the lower surface of service station canopies shall be fully shielded and utilize flat lenses.
3. Total Under-Canopy Output: The total light output used for illuminating service station canopies, defined as the sum of all under-canopy initial bare-lamp outputs in lumens, shall not exceed sixty (60) lumens per square foot of canopy in Lighting Zone II and III, and shall not exceed twenty (20) lumens per square foot in Lighting Zone I (note: these values are *not* footcandle illuminances). All lighting mounted under the canopy, including but not limited to luminaires mounted on the lower surface or recessed into the lower surface of the canopy and any lighting within signage or illuminated panels over the pumps, is to be included toward the total at full initial lumen output.
4. Inclusion Toward Total Outdoor Light Output: The lumen output of lamps mounted on or within the lower surface of a canopy is also included toward the lumen caps in Section 17.6.C as follows:
 - a. fixtures installed such that any part of the fixture is five feet or less from the nearest edge of the canopy are to be included in the total outdoor light output by simply adding the lumen outputs of the lamps used;

- b. fixtures installed such that all parts of the fixture are located at least five feet but less than 10 feet from the nearest edge of the canopy are to be included in the total outdoor light output as though they produced only one-quarter of the lamp's rated lumen output;
- c. fixtures installed such that all parts of the fixture are located ten or more feet from the nearest edge of a canopy are to be included in the total outdoor light output as though they produced only one-tenth of the lamp's rated lumen output.

B. Outdoor Recreational Facilities:

- 1. Lighting Class: Lighting for field/track/arena areas only shall be considered Class 1.
- 2. Lumen Cap Exemption: Lighting for field/track/arena areas only is not subject to the lumens per acre limit set in subsection 17.6.C.
- 3. Shielding: Fixtures used for field/track/arena areas must be fully shielded.
- 4. Curfew: No such facility shall be illuminated after the curfew times listed here except to conclude a scheduled recreational or sporting event in progress prior to the curfew, and prevented from concluding before the curfew by unforeseeable circumstances.

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Section 17.9:

- A. Airports: Airport navigation lighting systems are exempt from the provisions of this Ordinance. All other lighting at airports, including that used for loading areas, hangars, terminal aprons, parking areas, etc., shall conform to all applicable standards of this Ordinance.
- B. Holiday Decorations: Low-wattage holiday decorations are exempt from the provisions of this Ordinance from 15 November through 15 January. Such lighting and all associated wiring used outdoors must be certified for outdoor use by Underwriters Laboratories.

Section 17.10: Temporary Lighting Permits

- A. Findings: The Community Development Director may grant a permit for temporary lighting if he/she finds the following:
1. The purpose for which the lighting is proposed is not intended to extend beyond thirty (30) days; and
 2. The proposed lighting is designed in such a manner as to minimize light pollution as much as is feasible; and
 3. The proposed lighting will comply with the general intent of this Ordinance; and
 4. The permit will be in the public interest.
- B. Application Contents: The application for the Temporary Lighting Permit shall include the following information:
1. Name and address of applicant and property owner;
 2. Location of proposed fixtures;
 3. Type, wattage and lumen output of lamp(s);
 4. Type, shielding and use of proposed fixtures;
 5. Intended use of the lighting;
 6. Duration of time for requested exemption;
 7. The nature of the exemption;
 8. Such other information as the Community Development Director may request.
- C. The Community Development Director shall endeavor to rule on the application within five (5) business days from the date of submission of the request and notify the applicant in writing of his/her decision. The Community Development Director may grant one (1) renewal of the permit for an additional thirty (30) days if he/she finds that, because of an unanticipated change in circumstances, a renewal would be in the public interest. The Community Development Director is not authorized to grant more than one temporary permit and one renewal for the same property within one calendar year. A denial by the Director may be appealed to the Planning and Zoning Commission within 30 days.

Section 17.11: Nonconforming Uses

- A. Mercury Vapor: Mercury vapor lamps in use for outdoor lighting on the effective date of this Ordinance shall not be so used after 1 May 2006.

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B. Bottom-mounted Sign Lighting: Bottom-mounted outdoor advertising sign lighting shall not be used in Zones I, II and III after 1 May 1996.

C. Pre-existing Non-conforming Lighting: No outdoor lighting fixture which was lawfully installed prior to the enactment of this Ordinance shall be required to be removed or modified except as expressly provided herein; however, no modification or replacement shall be made to a nonconforming fixture unless the fixture thereafter conforms to the provisions of this Ordinance.

D. Conformance after Abandonment/Damage: In the event that an outdoor lighting fixture is abandoned or is damaged to the point of requiring repairs for safe operation, the repaired or replacement fixture shall comply with the provisions of this Ordinance.

Section 17.12: Variances

Any person desiring to install an outdoor lighting fixture in violation of this Ordinance may apply to the Board of Adjustment for a variance from the regulation in question. Such variances shall be allowed where a literal application or enforcement of the regulations would result in practical difficulty or unnecessary hardship and the relief granted would not be contrary to the public interest but do substantial justice and be in accordance with the spirit of the regulations and this Ordinance. Provided, that any variance may be allowed subject to any reasonable conditions that the Board may deem necessary to effectuate the purpose of this chapter.

Section 17.13: Permits and Development Plan Reviews

A. Non-Single Family Residential Lighting:

1. Permit Required: Whenever a person plans to install outdoor lighting, an outdoor lighting permit must be applied for and granted. The applicant shall, as a part of said application, submit sufficient information to enable the Community Development Director to determine whether the proposed lighting will comply with this Ordinance.

2. Application Contents: The application shall include the following:

- a. A site plan indicating any existing lighting fixtures and the proposed location of all new outdoor lighting fixtures, indicating which of the existing fixtures, if any, are to be retained and which, if any, removed;
- b. A description of each illuminating device, fixture, lamp, support and shield. This description may include, but is not limited to, manufacturer's catalog cuts and drawings (including sections where required), lamp types and lumen outputs. For existing lighting, photographs of the fixtures will be accepted if original manufacturer's information is not available;

- c. Such other information as the Community Development Director may determine is necessary to ensure compliance with this Ordinance.
- 3. Permit Issuance: If the Community Development Director determines that the proposed lighting does not comply with this Ordinance, the permit shall not be issued or the plan approved.

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B. Single Family Residential Lighting:

1. Lighting Reviewed: Lighting on single family residential sites will be reviewed on-site, and compliance with this Code verified before issuance of the Certificate of Occupancy. A lighting permit separate from the building permit is not required.

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